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ABSTRACT

This series of papers was presented in a symposium on behavior therapy. Each paper represents a separate study focusing on one aspect of behavior modification. The issue of reinforcement is prominant with regard to its type and source. Methods of self-reinforcement and older-peer modeling are studied. The suggestion that subjects who reinforce coverants (covert operants) which are incompatible with certain personal problems will consequently modify their maladaptive behavior is tested in one study and a modification of this theory is the basis of another. Individual papers include: (1) "In Vivo Emotive Imagery: An Experimental Test;" (2) "Behavioral Self-Control of Chronic Fingernail Biting;" (3) "Weight Loss Through Variations in the Covariant Control Paradigm;" (4) "A Test of the Incompatible Coverant Assumptions;" and (5) "The Effect of Older-Peer Participant Models on Deficient Academic Performance." (RWP)

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Weight Loss Through Variations In The Coverant Control Paradigm

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A paper presented in a symposium entitled Research in behavior therapy at the Annual Meeting of the American Educational Research Association, Chicago, April 1974.

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Abstract

Forty overweight female subjects were randomly assigned to one of eight treatment combinations in a 2 x 2 x 2 matrix. The use of positive coverants produced significantly ($p < .005$) more weight loss than negative coverants. No differences were found between those subjects employing eating and non-eating H P B's. Group counseling enabled a larger percentage of subjects to lose at least a pound per week than did individual intervention followed by self-management. Homme's paradigm should be shortened to three steps when applied to the problem of weight loss as certain treatment combinations were nearly 100% effective.

Weight Loss Through Variations In The Coverant Control Paradigm

Coverants (a contraction of covert operants) are mental behaviors such as thoughts, images, reflections, feelings and the like. The term was coined by Homme (1965) who suggested that both coverants and operants could be manipulated by the same kinds of environmental cues and consequences. Homme further speculated that the subject could serve as his own experimenter. For instance, to obtain some long range goal such as losing weight, he might attempt to increase the frequency of specific coverants which were "incompatible" with his overeating habits. Incompatible coverants are of two types. Negative coverants deal with the aversive aspects of being overweight. Positive coverants focus on the desirable attributes of being properly proportioned. Examples might include images of an obesity related coronary attack vs greatly increased sexual prowess when weight is lost.

Homme recommended a self-management application of the Premack principle as a means of coverant acceleration [i.e., "For any pair of responses, the more probable response will reinforce the less probable one (Premack, 1965, p. 132)"] . More specifically, overweight subjects might be instructed to repeatedly engage in the following four-step sequence:

1. detection of an eating stimulus
2. emission of a negative coverant
3. emission of a positive coverant
4. engagement in a "reinforcing" or highly probable behavior (HPB).

In an important system variation Homme (1966) acknowledged that HPB preparatory stimuli could initiate the sequence. Theoretically, with either system variation, the HPB would reinforce the preceeding steps and the resulting weight loss would ultimately reinforce continued participation in the self-managed coverant control system.

Support for the assumption of coverant incompatibility was recently displayed in a study which found that obese individuals are extremely unwilling to tolerate a reflected image of their bodies (Horan, Baughman, & Jenkins, 1974). Thus, negative coverants are in fact lowly probable. Furthermore, they need not be especially horrifying but simply indicative of the status quo. The "incompatibility" of positive coverants, however, remains to be tested.

Homme's assumptions concerning the technology of coverant acceleration have been subjected to rather penetrating conceptual criticism. Mahoney (1970) offered two revisions based on laboratory and practical considerations, and Danaher (1974) pointed out that in keeping with original Premackian formulations only a special class of HPB's should ever be employed. The latter criticism is particularly devestating in terms of applying coverant control to problems of weight loss, as there are few potential HPB's that are truly "free", that can occur frequently, and that have hedonic value anywhere near that of eating.

Be that as it may, Homme's coverant control paradigm has proved to be clinically useful (e.g., Horan & Johnson, 1971; Mahoney, 1971; Todd, 1972). The present study was undertaken in a highly inductive frame of reference. Just as systematic desensitization may "work"

in spite of the controversy concerning "why" (Evans, 1973), might not certain variations in Homme's paradigm prove to be empirically more effective than others in spite of a priori theoretical accoutrements?

The first variable of interest was the possible differential effects of positive and negative coverants. If only one type is particularly reactive, the four step sequence could be streamlined to three, thus minimizing the "frustrative - non reward" issue raised by Mahoney (1970).

A second experimental concern evolved from Homme's vitrolic protestation that the HPB should not be the problem behavior. Admittedly, one might question the logic of using an unwanted behavior to reward thinking about not engaging in that behavior. On the other hand, with the obese, eating per se is not the problem. Overeating--that is, excessive consumption in response to external rather than internal stimuli--is the undesirable activity. Furthermore, might not the quantity of calories ultimately consumed be considerably diminished after thinking about the potential consequences of continued imbibing? Finally, if in fact the HPB really serves to cue rather than reinforce the sequence (a legitimate alternate explanation), perhaps the repeated pairing of food stimuli with incompatible coverants would reduce the attractiveness or probability of eating.

The last experimental issues concern the reality of Homme's self-management assumption, the potential differential effects of individual vs group counseling modes, and the question of cost

effectiveness. Specifically, if therapist time and caseload are held constant, are weekly group meetings more effective than intensive individual intervention followed by self-management?

Method

Forty female respondents to newspaper announcements of a weight control program were randomly assigned to one of eight treatment combinations in a 2 x 2 x 2 matrix. The independent variables were: 1. coverant type (positive or negative). 2. HPB type (eating or non-eating). 3. counseling mode (individual or group). Five subjects, for example, were counseled on an individual basis and used the act of eating to reinforce the emission of positive coverants. Since the experimental questions specifically and exclusively concerned comparisons between variations of an already established therapeutic procedure, placebo controls were considered superfluous.

All of the subjects placed a $20 deposit which was refunded (contingent upon mere attendance) in gradually increasing amounts over the course of the eight week program. Two subjects withdrew for valid medical reasons shortly after enrolling (one became pregnant, the other was hospitalized for thrombosis). They were replaced by subjects randomly selected from a waiting list. Three other subjects dropped out of the program for reasons unknown after investing at least four weeks. Their weights at the time of withdrawal were used in the final analysis.

The subjects were seen by one of two properly proportioned, male counseling psychologists with earned doctorates. A booklet (Horan, 1971)

containing a behavioral explanation of obesity, suggestions for stimulus control, and an optional 1000 calorie per day food exchange diet was given to all subjects. Losses of between 1 and 2 pounds per week were to be considered ideal. Weights were taken at the outset of every counseling session at approximately the same time of day, on the same balance type scale, in street clothes minus shoes, to the nearest quarter-pound.

To facilitate coverant identification, open-ended questionnaires seeking idiosyncratic reasons for losing weight were mailed to all subjects prior to their first counseling interview. After potential coverants were identified, the subjects were given approximately 10 minutes of imagery training a la' Phillips (1971). A credit card type display packet in which cue words for specific coverants could be stored and viewed was also provided. The subjects were urged to develop a clear image instead of simply reading the words prior to participation in an HPB.

Half of the subjects received a questionnaire in the mail designed to identify potential non-eating HPB's. (Use of eating as an HPB for the remaining half was predetermined.) All subjects were instructed to self-monitor the frequency and clarity (McCullough & Powell, 1972) of coverant emission on a daily basis. However, since the data derived from such self-report forms is highly influenced by experimental demand characteristics, no analyses were planned. Self-monitoring was simply expected to increase the reactivity of each treatment combination.

Subjects in the individual counseling mode met with their counselor for three half-hour sessions. The first session took place several days after the subject applied for program, placed her deposit, and received an initial weighing. The second and third sessions followed the first by one and eight weeks respectively. Subjects receiving group counseling (n = 5 per group) met for approximately 55 minutes each week throughout the eight week program. Therapist time and caseload were thus held constant for each counseling mode.

Results

A 2 x 2 x 2 (coverant type by HPB type by counseling mode) analysis of variance was performed on the subjects' "percentage lost" scores [(Pre-Post)/ Pre x 100%] . Table 1 depicts individual losses as well as group means and standard deviations for each treatment combination.

Insert Table 1 about here

A highly significant main effect was found for coverant type [F (1, 32) = 9.29, $p < .005$] . The use of positive coverants, regardless of counseling mode or HPB type, produced considerably more weight loss than did negative coverants. In practical terms, 75% of the subjects experiencing positive coverants lost at least a pound a week compared to 35% of the subjects experiencing negative coverants who met such a criterion.

No significant differences were found between those subjects using the act of eating to reinforce coverant elicitation and those

subjects using non-eating HPB's [F (1, 32) = 2.36, $p < .14$] . Each reinforcement methodology enabled 55% of its participants to lose a pound a week.

Many of the subjects in the individual counseling mode expressed a preference for more frequent meetings. Only one subject in the group counseling mode appeared dissatisfied with the format. Although 65% of the group counseled subjects compared to 45% of the individually counseled subjects, met the pound per week criterion, the analysis of variance on individual scores was not significant [F (1, 32) = 2.25, $p < .14$] .

No significant interactions occurred, possibly because of the small cell n's, however, it should be noted that the least effective treatment combinations involved pairing the act of eating with negative coverant elicitation. Only three subjects in the study did not lose weight. Two "gainers" were found in the negative - eating HPB - individual cell; one "no loss" occurred in the negative - eating HPB - group cell.

Group counseling involving positive coverant elicitation produced the most weight reduction. Here, the HPB type was of no consequence. All but one subject in these two cells lost in excess of one pound per week. The lone "failure" missed this mark by a mere four ounces.

Discussion

The twofold problem of weight loss and maintenance is far more complicated than the literature on coverant control would imply. Demand characteristics notwithstanding, the seriously obese individual

who faithfully follows Homme's original paradigm for a sustained period of time is a rarity (Horan & Johnson, 1971). For this reason, no long term follow-up was conducted. At most, coverant control ought to be considered as a highly reactive, albeit short range, treatment component of a comprehensive program which must also include, for example, stimulus control and dietary information (Horan, 1973).

Since most individuals assigned to delayed or no treatment control groups rarely lose and indeed often gain weight, the fact that 55% of the subjects in this study achieved the success criterion of a pound per week would suggest that coverant control regardless of format is better than nothing at all. More important, however, is the finding that the use of positive coverants produces significantly (and practically!) greater weight loss than the use of negative coverants. Clinicians employing Homme's original paradigm now ought to give serious consideration to dropping the ~~third~~ second step in the sequence. Positive coverants are not only substantially more reactive than negative coverants, but their exclusive use also seems to produce much less variability in subject responsiveness (a difficulty which characteristically plagues coverant control and obesity research). In this study, group counseling involving the use of positive coverants was nearly 100% effective.

Homme (1965, p 507) anticipated the finding that pairing negative coverants with the target behavior is a "most treacherous...error." This may be true, but possibly not for the reasons Homme provided. Instead of the expected "adaptation to the aversiveness of the coverant (p 506)," many subjects apparently resisted or at least did

not sustain this rather uncomfortable form of self-management. For example, one subject reported "Thinking about all those awful images made me depressed; I found myself eating more, so I just cut it out entirely." Other subjects expressed similar views.

The use of eating to reinforce positive coverants, however, was not similarly problematic. After thinking about the desirable aspects of being properly proportioned, the subjects were seemingly content to limit themselves to a relatively small amount of food. Oftentimes the subjects would follow eating stimuli with the positive coverant and not eat at all. Perhaps positive coverants -- coupled with the knowledge that weight loss is in fact occurring -- are reinforcing in their own right.

Essentially, this study has found that Homme's original paradigm can -- and should -- be shortened to three steps when applied to the problem of weight loss. After detection of an eating or HPB stimulus, overweight individuals ought to reinforce only positive coverants. It apparently doesn't matter whether eating is used as an HPB, but weekly group counseling may be more promising than individual intervention followed by self-management.

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Table I

Individual Percentage Weight Loss and Summary Statistics

For Each Treatment Combination

		Positive Coverants					Negative Coverants				
		S	Pre Weight (lbs.)	Post Weight (lbs.)	% Loss	Mean Cell Loss (%)	Cell S.D. (%)	S	Pre Weight (lbs.)	Post Weight (lbs.)	% Loss	Mean Cell Loss (%)	Cell S.D. (%)
Individual Counseling	Eating HPB's	1	225.00	216.25*	- 3.9			21	160.50	164.00	+ 2.2		
		2	154.50	146.00*	- 5.5			22	192.00	188.00	- 2.1		
		3	173.50	170.50	- 1.7	-4.50	1.77	23	182.75	178.00	- 2.6	-1.60	3.04
		4	172.75	162.00*	- 6.2			24	168.50	169.00	+ .3		
		5	173.25	164.25*	- 5.2			25	146.00	137.50*	- 5.8		
	Non-Eating HPB's	6	165.25	158.00	- 4.4			26	155.75	140.00*	-10.1		
		7	131.00	126.50	- 3.4			27	159.50	158.00	- .9		
		8	205.00	192.00*	- 6.3	-4.50	1.43	28	191.50	186.25	- 2.7	-4.80	3.94
		9	190.25	179.50*	- 5.6			29	161.00	148.50*	- 7.8		
		10	146.50	142.25	- 2.9			30	171.25	167.00	- 2.5		
Group Counseling	Eating HPB's	11	224.50	214.25*	-4.6			31	163.50	146.50*	-10.4		
		12	130.00	119.50*	-8.1			32	143.00	141.25	- 1.2		
		13	119.50	110.25*	-7.7	-7.40	1.61	33	151.00	151.00	0.0	-3.00	4.20
		14	135.75	124.50*	-8.3			34	165.50	162.00	- 2.1		
		15	158.75	145.25*	-8.5			35	252.25	249.00	- 1.3		
	Non-Eating HPB's	16	154.00	144.75*	-6.0			36	224.25	216.25*	- 3.6		
		17	141.25	129.25*	-8.5			37	152.50	143.25*	- 6.1		
		18	175.00	162.00*	-7.4	-6.80	1.45	38	162.75	153.00*	- 6.0	-3.30	2.78
		19	159.75	152.00	-4.8			39	136.25	135.50	- .6		
		20	172.50	159.50*	-7.5			40	142.75	142.25	- .4		

* indicates a loss of at least 1 pound per week

Table I

Individual Percentage Weight Loss and Summary Statistics

For Each Treatment Combination

		Positive Coverants					Negative Coverants				
		S	Pre Weight (lbs.)	Post Weight (lbs.)	% Loss	Mean Cell Loss (%)	Cell S.D. (%)	S	Pre Weight (lbs.)	Post Weight (lbs.)	% Loss	Mean Cell Loss (%)	Cell S.D. (%)
Individual Counseling	Eating HPB's	1	225.00	216.25*	- 3.9			21	160.50	164.00	+ 2.2		
		2	154.50	146.00*	- 5.5			22	192.00	188.00	- 2.1		
		3	173.50	170.50	- 1.7	-4.50	1.77	23	182.75	178.00	- 2.6	-1.60	3.04
		4	172.75	162.00*	- 6.2			24	168.50	169.00	+ .3		
		5	173.25	164.25*	- 5.2			25	146.00	137.50*	- 5.8		
	Non-Eating HPB's	6	165.25	158.00	- 4.4			26	155.75	140.00*	-10.1		
		7	131.00	126.50	- 3.4			27	159.50	158.00	- .9		
		8	205.00	192.00*	- 6.3	-4.50	1.43	28	191.50	186.25	- 2.7	-4.80	3.94
		9	190.25	179.50*	- 5.6			29	161.00	148.50*	- 7.8		
		10	146.50	142.25	- 2.9			30	171.25	167.00	- 2.5		
Group Counseling	Eating HPB's	11	224.50	214.25*	-4.6			31	163.50	146.50*	-10.4		
		12	130.00	119.50*	-8.1			32	143.00	141.25	- 1.2		
		13	119.50	110.25*	-7.7	-7.40	1.61	33	151.00	151.00	0.0	-3.00	4.20
		14	135.75	124.50*	-8.3			34	165.50	162.00	- 2.1		
		15	158.75	145.25*	-8.5			35	252.25	249.00	- 1.3		
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		18	175.00	162.00*	-7.4	-6.80	1.45	38	162.75	153.00*	- 6.0	-3.30	2.78
		19	159.75	152.00	-4.8			39	136.25	135.50	- .6		
		20	172.50	159.50*	-7.5			40	142.75	142.25	- .4		

* indicates a loss of at least 1 pound per week

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"IN VIVO" EMOTIVE IMAGERY: AN EXPERIMENTAL TEST*

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A paper presented in a symposium entitled Research in behavior therapy at the Annual Meeting of the American Educational Research Association, Chicago, April 1974.

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A B S T R A C T

The process of focusing on positive covert events during overt anxiety arousing situations has been termed "in vivo" emotive imagery. Thirty-six subjects were blocked on sex and randomly assigned to no treatment control, distraction control, or experimental treatment conditions. Mean ice water tolerance scores were 51.7, 77.3, and 146.4 seconds respectively. A 2 x 3 (sex by treatment) ANOVA followed by WSD post hoc comparisons revealed that "in vivo" emotive imagery was significantly more effective than no treatment control procedures. Possible sources of subject variability were discussed.

"In Vivo" Emotive Imagery: An Experimental Test

Emotive imagery is a behavior therapy technique which closely parallels systematic desensitization. In lieu of deep muscle relaxation, however, classes of images which are assumed to arouse feelings of self-assertion, pride, affection, mirth, etc., are used to inhibit the anxiety arising from a given hierarchy scene. This procedure has proven to be particularly effective in the treatment of children's phobias (Lazarus & Abramovitz, 1962).

The process of focusing on positive covert events during overt anxiety arousing situations has been termed "in vivo" emotive imagery. Unlike traditional emotive imagery, the tension producing stimuli occur in real life rather than in imagination and simultaneously with rather than intermittently woven into the positive fantasy. The technique seems to be especially useful in coping with inescapable discomforting situations such as childbirth (Horan, 1973).

Neither emotive imagery nor "in vivo" emotive imagery have been subjected to extensive empirical scruntiny. This study attempted to determine if certain images assumed to elicit feelings of relaxation could enhance tolerance of noxious stimulation. Specifically, it was expected that subjects exposed to "in vivo" emotive imagery would exhibit greater ice water endurance than would subjects exposed to distraction and no treatment control procedures.

Method

All 36 subjects (18 male and 18 female) were enrolled in introductory counseling courses at a major university. None had ever taken part in any imagery experiment; most had no exposure at all to the practice of behavior therapy.

A larger group of subjects was initially given 20 minutes of imagery training a la Phillips (1971). The clarity of their last image was assessed by the SUI scale (McCullough & Powell, 1972). Those scoring at least 7 (over 90%) and

meeting scheduling requirements were blocked on sex and randomly assigned to one of three tape-recorded experimental procedures conducted within 2 days of the imagery training.

Each treatment was administered in counterbalanced order in the same 9' x 12' room illuminated only by daylight. The subjects were led into the room individually and asked to be seated on an armless chair, to the right of which was placed a polyethylene bucket containing 9" of ice water. The water was kept at a constant temperature (33°F) by the addition of fresh ice between subjects. All subjects were informed that they could terminate the experiment at any time, and that further directions would be given via audio tape. The experimenter then turned on the recorder and left the room. An observer standing behind a 1-way mirror recorded the time interval between the subjects' hand entering and leaving the ice water to the nearest .1 second. No subject was permitted to leave his hand in the water for longer than 5 minutes.

Complete transcripts of the recorded experimental conditions are available from the authors on request. In Treatment I, a no treatment control, the subjects were simply instructed to place their right hand in the ice water for as long as they could. Treatment II served as a distraction control. While their hands were immersed, the subjects were told to look at the door of the room and to count backwards from 1000. In Treatment III, the "in vivo" emotive imagery treatment, classes of images which were assumed to arouse feelings of comfort and relaxation (e.g., walking through a lush meadow, looking at a clear blue lake, etc.) were vividly described concurrent with the noxious stimulation.

Results

The subjects exposed to "in vivo" emotive imagery were able to endure the ice water nearly three times as long as those in the no treatment control group and nearly twice as long as those in the distraction control group. Table I presents the group means and standard deviations. A third of the subjects in

Insert Table I about here

the experimental treatment (3 females and 1 male) were able to tolerate the noxious stimulation for the entire 5 minute period. Only 2 subjects, both males, could last more than 3 minutes in the distraction control, while just one male in the no treatment control obtained a score better than 2 minutes.

A 2 x 3 (sex by treatment) analysis of variance followed by WSD post hoc comparisons (Games, 1971) was conducted on the subjects' cold tolerance scores. The "in vivo" emotive imagery treatment proved to be significantly better than the no treatment control ($p < .03$), but only directionally more effective than the distraction control, which in turn was directionally better than the no treatment control. As can be seen from Table II considerable subject variability regardless of treatment (error variance) was displayed. No significant sex or interaction effects emerged.

Insert Table II about here

Discussion

Apparently "in vivo" emotive imagery is an effective modifyer of pain tolerance. In spite of the relatively small n and the wide subject variability, a significant effect did appear.

Further attention should now be directed in two areas. In the first place, only one variation of the "in vivo" emotive imagery treatment was examined here. Classes of images assumed to arouse feelings of anger or myrth may eventually prove to be more effective inhibitors of pain (and/or anxiety confounded pain) than relaxation. Wolpe (1969), for example, reports that Soviet research "has yielded unequivocal evidence of the existance of separate and reciprocally inhibitory centers for anger and anxiety in the midbrain [p. 62]."

Secondly, possible sources of inter-sex, inter-subject variability need to be closely studied. In terms of between sex variability, the means depicted in Table I suggests that females are especially responsive to the experimental treatment, almost to the point of an interaction ($p < .18$). Explanations of this potential reactivity remain unformulated, awaiting replication with larger cell n's. In terms of within treatment variability, the subjects in this study could easily avoid the noxious stimulation by simply removing their hands from the water. With more "meaningful" dependent variables or inescapable discomforting situations such as childbirth, perhaps this differential responsiveness would diminish considerably.

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TABLE I

Means and Standard Deviations of Ice Water Tolerance Scores of Male and Female Subjects Under Each Experimental Condition

Condition	Sex	Ice Water Tolerance*	
		$\bar{x}$	s
No Treatment Control	M	69.5	52.6
	F	34.0	19.9
	Total	51.7	39.7
Distraction Control	M	111.0	81.2
	F	43.7	28.3
	Total	77.3	60.8
In Vivo Emotive Imagery	M	117.0	111.6
	F	175.8	137.4
	Total	146.4	125.1

* In seconds

TABLE II

Analysis of Variance Summary Table

Source	SS	MS	DF	F	P
Sex	1936.001	1936.001	1	0.277	.602
Treatment	57515.96	28757.98	2	4.120	.026
Interaction	25779.73	12889.86	2	1.847	.175
Error	209398.4	6979.947	30		

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A Test of the Incompatible Coverant Assumption*

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Abstract

In an experiment camouflaged as a product evaluation survey, obese and properly proportioned males and females rated the quality of a mirror positioned in such a way as to reflect their bodies from the neck down. The comparatively extreme unwillingness on the part of the obese to entertain such an image ($p < .001$, almost non-overlapping distributions) lends strong support to Homme's assumption that certain covert behaviors are incompatible with overt behavior problems.

A Test of the Incompatible Coverant Assumption

Homme (1965) has suggested that subjects who reinforce coverants (covert operants) which are incompatible with certain personal problems (e.g., obesity, smoking, depression) will consequently modify their maladaptive behavior. Thus, if one wanted to lose weight he might attempt to increase the frequency of specific thoughts, images, reflections, etc. which interfere with his overeating habits.

Apart from the difficulties involved with the technology of coverant accelleration (see Danaher, in press), Homme's paradigm rests on the assumption that various covert behaviors are in fact incompatible with a given overt behavior problem. Will a smoker, for example, continue smoking while at the same time holding an X-ray image of his cancerous lung? Or, as this study sought to determine, in comparison to properly proportioned individuals, how long can overweight people tolerate a reflected image of their bodies?

Method

Two independant observers classified persons entering the lobby of a graduate center at a major university as either obese (waistline $\geq$ chestline[1]) or properly proportioned. The cooperation of those persons who were alone and on whom the raters agreed was solicited by an experimenter posing as a marketing student conducting a product evaluation survey. Five persons declined; these included an obese male and female, and two males and one female of normal weight. Forty subjects with equal representation of obese and properly proportioned males and females agreed to participate.

The subjects were told that a 14" by 54" mirror (with masking-taped edges) was being presented to the general public for evaluation.

The mirror was positioned 6" from the floor in such a way that when the subjects stood in front of it only the image of their bodies from the neck down was reflected. When they finished looking, the subjects rated the mirror on a 5 point scale in terms of its brightness, color fidelity, image clarity, and presence of distortion. The amount of time spent looking at the mirror was determined by a second experimenter using a concealed stopwatch.

Results

Seperate 2 x 2 (weight by sex) analyses of variance were conducted on the image tolerance and product rating variables. Table 1 presents the means and standard deviations for each group of subjects.

Insert Table 1 about here

Compared to subjects of normal weight, the obese group was unable to tolerate the reflected image of their bodies ($p < .001$). The distributions of obese and properly proportioned males did not even overlap. Similar but less pronounced differences were found with females. With one exception the distributions of normal and overweight females also did not overlap.

In terms of the product rating scores, differences between groups were negligible. Neither the weight nor the sex of the subjects had any effect on their judgments of the mirror's quality.

Discussion

It is quite clear that obese individuals are extremely unwilling to entertain an image of their bodies. Homme's (1965) assumption that specific covert behaviors are in fact incompatible with overt behavior problem areas thus seems verified. Furthermore, the coverant need

not be horrifying, but simply indicative of the status quo.

The technology of coverant accelleration, however, is at best primitive. In lieu of self-management applications of the Premack principle (Horan & Johnson, 1971), behavior therapists might consider having their overweight clients attach full length mirrors to the refrigerator door. One might guess that if the door is opened at all, it would be quite rapidly.

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Footnote

1. Appreciation is extended to Michael J. Mahoney for his suggested use of this criterion.

Table 1

Means and Standard Deviations For Each Group of Subjects

On Each Dependent Variable

Group	Variable			
N=40	Image Tolerance*		Product Rating	
	$\bar{X}$	s	$\bar{X}$	s
Obese Males	5.6	1.8	15.1	2.5
Normal Males	22.4	11.3	15.7	2.9
Obese Females	5.3	2.6	14.2	3.1
Normal Females	16.0	8.2	15.7	3.2

* in seconds

3.02 G

BEHAVIORAL SELF-CONTROL OF CHRONIC FINGERNAIL BITING ' "

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' Descriptors: Self-control, Fingernail Biting

" Requests for reprints should be sent to the first author.

Abstract

Volunteer chronic fingernail biters participated in a behavioral self-control program incorporating self-monitoring, self-punishment, and self-reward techniques. Gains in nail length and improved cosmetic appearance persisted through a follow-up evaluation. The comprehensive self-control program appears to be highly productive, however, the relative efficacy of individual treatment components was not clearly established.

BEHAVIORAL SELF-CONTROL OF CHRONIC FINGERNAIL BITING

At first blush, fingernail biting would appear to be a relatively trivial clinical problem. To persons chronically afflicted with the disorder, however, the presence of stubby, ragged nails accompanied by bloody, disfigured cuticles, and permanent low grade infection can be highly disconcerting.

Aversive social consequences ultimately accompany the physical disturbance. For instance, nail biters often avoid dining with friends, playing cards, wearing rings, and so forth. In effect, they deprive themselves of many activities which the nonafflicted find quite enjoyable.

The incidence of nail biting among the general population is surprisingly high. Reviewing several surveys, Smith (1957) points out that between one third and one half of all grammar school children bite their nails, while 27% of college men and 19% of college women still persist in the habit.

Psychodynamic interpretations of the disorder ranging from ersatz masturbation to attenuated suicide, though colorful, have proved impotent insofar as the generation of effective treatment programs is concerned (Bucher, 1968). Unfortunately, behavioral approaches to the problem including negative practice

(Smith, 1957), threatened money loss (Stephen & Koenig, 1970), self-monitoring variants (McNamara, 1972), and self-administered electro-shock (Bucher, 1968), have not fared too well either. Failure rates of 50% are usual, and even with success cases, the incremental effectiveness of such techniques over and above gains attributible to simply volunteering for treatment have not been clearly established.

This study sought to determine the utility of a behavioral self-control program incorporating self-monitoring (SM), self-punishment (SP), and self-reward (SR) techniques directed toward reducing the frequency of placing fingers in the mouth area, a behavior immediately preceding biting in the response chain. Gains in fingernail length and improved cosmetic appearance were expected to occur.

Method

Subjects one and two were self-referred; subjects three through eight responded to a printed announcement concerning the program posted on a library door. All subjects reported a life long history of nailbiting with many previous unsuccessful attempts to stop. Fingernail length was measured from the top center of the nail to a point which seperated the bottom

center of the nail and the cuticle. A draftsman's scale accurate to 1/64 in. was employed. Perfect agreement was achieved by the raters (J.H. and A.H.) on 70% of a sample of joint judgements. The remaining 30% of the estimates were within 1/64 in. of each other. Additionally, a rather subjective cosmetic appearance score was unobtrusively derrived by summing the number of fingers showing traces of blood or scabs with the number of fingers showing cuticle disfigurement.

The subjects were seen individually by either J.H. or A.H. for a total of six brief sessions, none lasting longer than 1/2 hour. The self-control program consisted of four phases taking place over a 7 week period. Phase I, DT or baseline, lasted 3 weeks. None of the subjects were given any information regarding the actual program content, however, nonspecific "relationship" factors (e.g., therapist attention, concern, etc.) were present during the period. After nail length and cosmetic appearance measures were taken, the subjects were told that because the end of the present academic term was imminent, they would be seen again at the beginning of the subsequent term.*

Phase II, the SM phase, lasted 1 week. The subjects

were told to keep record of the instances in which they placed any one of their fingers in the mouth area (3 fingers would receive 3 tallies). During this time they were also instructed to pay particular attention to the environmental antecedents of the target response. Self-monitoring is occassionally reactive in and of itself (Mahoney & Thoreson, 1972). McNamara's (1972) study, however, suggests that with nail biters this procedure is necessary but insufficient for the attainment of self-control.

In Phase III, SM+SP, the subjects were seen twice over a 2 week period and instructed to self-punish every occurrence of the target response and to self-monitor every behavior so consequated. The aversive stimulus consisted of a 1/4 in. guage rubber band permanently worn and painfully snapped on the inside of the wrist. Since in any punishment paradigm one might expect subjects to avoid the punishing agent rather than to supress the punished response, liberal therapist approval, positive feedback on program success, and the reactive effects of self-monitered consequation per se, were all expected to help "keep the system going."

During Phase IV, SM+SR, which lasted 1 week, the subjects were instructed to discontinue the aversive stimulation, but

to continue self-monitoring instances of placing their fingers in the mouth area. By this time the antecedent conditions of the response were clearly established for each subject, and a suggestion was made that they might "do something else," i.e., engage in a reinforced incompatible response, such as fist clenching or tapping the nails on a hard surface followed by "in vivo" emotive imagery (Horan, 1973; Horan & Dellinger, 1974). One subject, for example, found the self-reward of imagining compliments on her engagement ring and "pretty hands" to be highly effective.

Upon completion of the program, the subjects were not informed that a follow up evaluation would be conducted. A student assistant (M.M.) not identified with the study arranged to informally meet with the subjects 6 weeks later. She inconspicuously noticed the appearance of the nails and started a conversation about the study in an attempt to determine if the nail biting habit had re-emerged.

Results

Subjects one and two (a 31 year old male and a 23 year old female) participated in a pilot version of the program. The procedures were essentially identical to those described

above, however, no formal measurements were taken, nor was a *DT* phase included. Both subjects reported complete elimination of the nail-biting response. Gains in nail length and improved cosmetic appearance were"obvious."

Figures 1, 2, and, 3 present the data collected on subjects 3, 4, 5, and, 6 (two males, aged 23 and 26 respectively, and two females, aged 21 and 20 respectively). As can be seen from Figure 1, fingernail length increased dramatically (22% or a mean growth of .127 in.) over the course of the self-control program. The efficacy of the treatment package is even more pronounced than this figure would indicate, because all of the subjects reported the need to clip or file most, if not all, of their nails during the last 2 weeks of the program. Improvement was negligible ($\bar{X}$ = .006 in.) during the 3 week *DT* phase suggesting that therapist relationship variables, instrument reactivity, and motivistion (i.e., volunteering for treatment) were not contributing factors.

Insert Figure 1 about here

Greatly improved cosmetic appearance is also evident in Figure 2. From an average of nine fingers showing blood and/or

cuticle damage, the subjects improved to an average of only one finger so disfigured. This latter score is apparently inflated, because some of the previously self-inflicted wounds were slow to heal.

Insert Figure 2 about here

At the conclusion of the self-control program all subjects reported complete elimination of the nail biting response. Declines in the target behavior--placing fingers in the mouth area regardless of whether or not biting ensued--are depicted in Figure 3. Self-recorded instances of this behavior dropped from an average of 16 times daily to twice daily.

Insert Figure 3 about here

At the end of the 6 week follow up period, an unobtrusive meeting could not be arranged with one of the subjects, however, a telephone interview indicated no further problems. All of the other subjects were apparently symptom free. Save for one nail broken during "typing," none of the subjects showed any signs of self-inflicted nail or cuticle damage. All reported feelings of elation, pride, and gratitude.

Data are not reported for subjects seven and eight (females aged 21 and 20 respectively). Subject seven stopped biting her nails approximately 3 days before the initial measurements were taken. Her dentist informed her that the habit was causing her teeth to seperate from her gums and she would soon be in danger of needing peridontal work. Subject eight bit selectively, (3 nails in particular). She took a job during the delayed treatment phase and was "too busy" to continue participation.

Discussion

Although the behavioral self-control treatment "package" worked as expected, the relative efficacy of the individual components (SM, SM+SP, SM+SR) was not clearly established. One subject was not at all responsive to SM, yet was highly affected by SM+SP. None of the other subjects showed such differential reactivity, but rather made consistent gains throughout the program.

The variable responsiveness of SM found in this study is consistent with the observation that SM works for some people, with some problems, some of the time (Kanfer & Karoly, 1972; Mahoney, 1972). Although three of the four subjects improved under the SM contingency alone, one might expect that

if this phase were extended indefinitely, then the null effects of McNamara (1972) would indeed be replicated.

The SP contingency was perceived by the subjects as the "meat" of the program. All made consistent gains during this period. However, the contribution of SM to SP, if any, cannot be determined. Although the efficacy of SM+SP is apparent, the utility of SM+SR remains unconfirmed. In the first place, the gain scores are definitely underestimations, because all subjects trimmed their nails before the final assessment of this phase was made. Such could suggest that, for at least three subjects, SR was in fact more productive than SP. On the other hand, since "success feeds upon itself" SP confounding may be implied.

The major purpose of this study was to develop a behavioral self-control program which could be applied to a wide spread problem that has so far been quite refractory to change. Academic questions of differential responsiveness might be answered by more complex factorial designs, which then in turn might suggest improvements in the efficacy of the paradigm employed here.

Footnote

*History was not thought to be a source of internal invalidity because the initial assessment was made during the final exam period (when exacerbation of the problem might be predicted), while the second set of measurements followed 3 weeks of "recovery." Such a control phase was expected to render confirmation of the experimental hypothesis even more difficult. Despite these initial concerns, a stable baseline was obtained.

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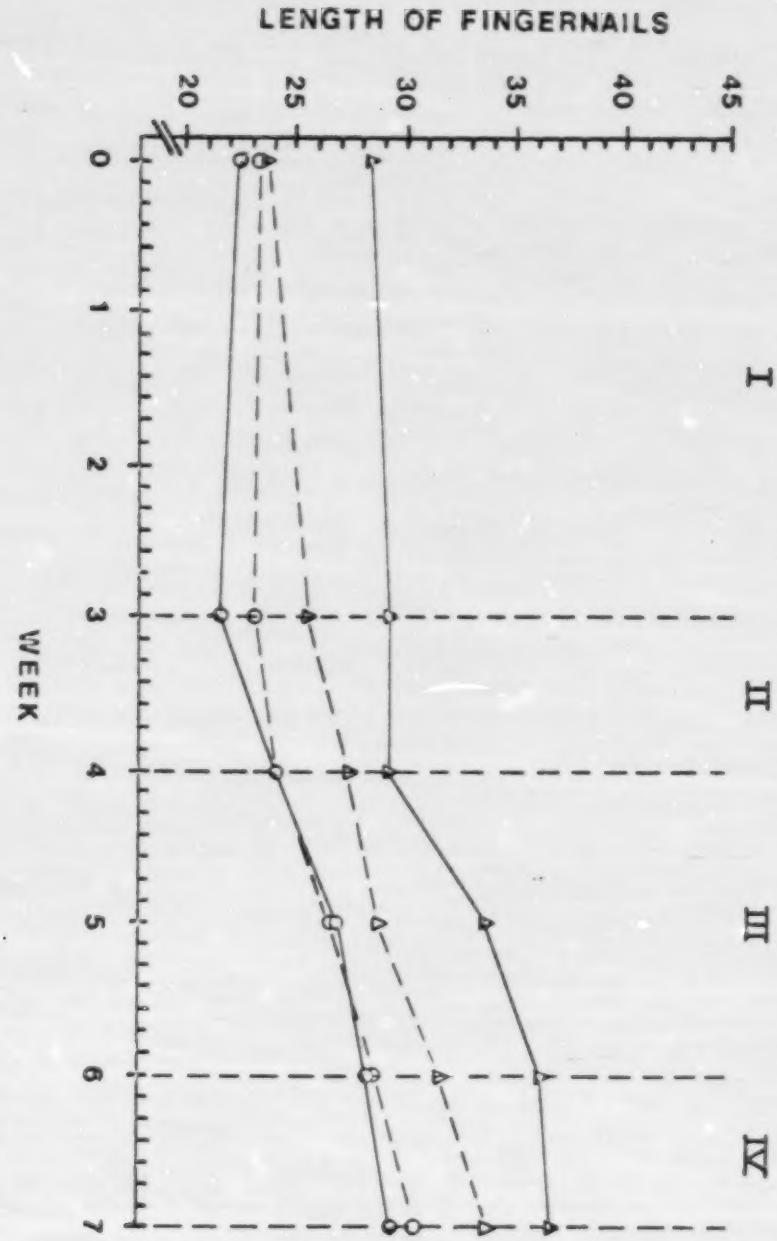
Figure 1. Average length of each subject's fingernails (in 1/64 in. units) throughout each phase of the self-control program. I--DT, II--SM, III--SM+SP, IV--SM+SR.

Figure 2. Cosmetic appearance scores (number of fingers showing blood or scabs plus the number of fingers showing cuticle disfigurement) for each subject throughout each phase of the self-control program. I--DT, II--SM, III--SM+SP, IV--SM+SR.

Figure 3. Weekly frequency of the self-monitored target response (placing fingers in the mouth area) for each subject throughout each phase of the self-control program. I--DT, II--SM, III--SM+SP, IV--SM+SR.


LENGTH OF FINGERNAILS
20
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II
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Figure 1.

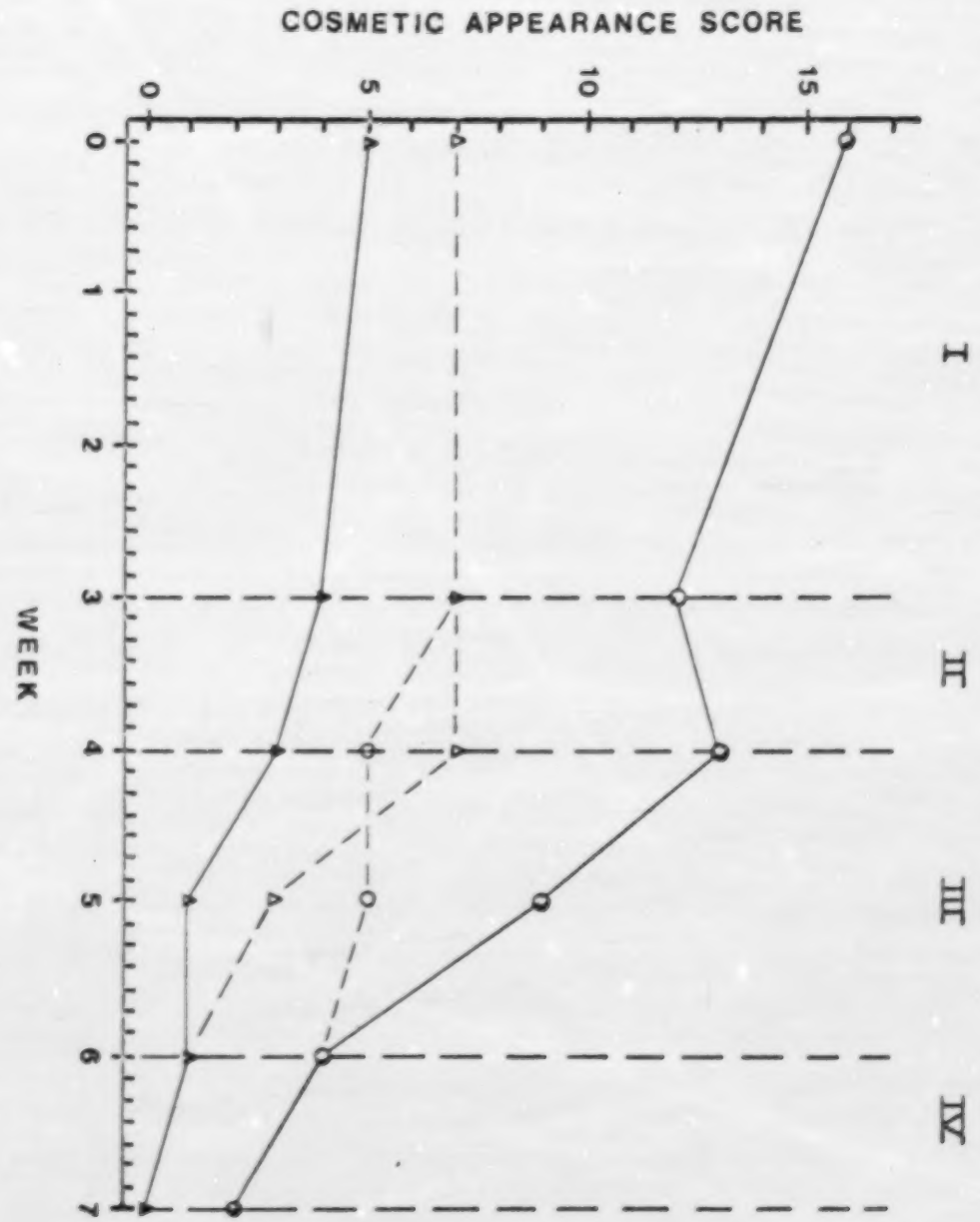
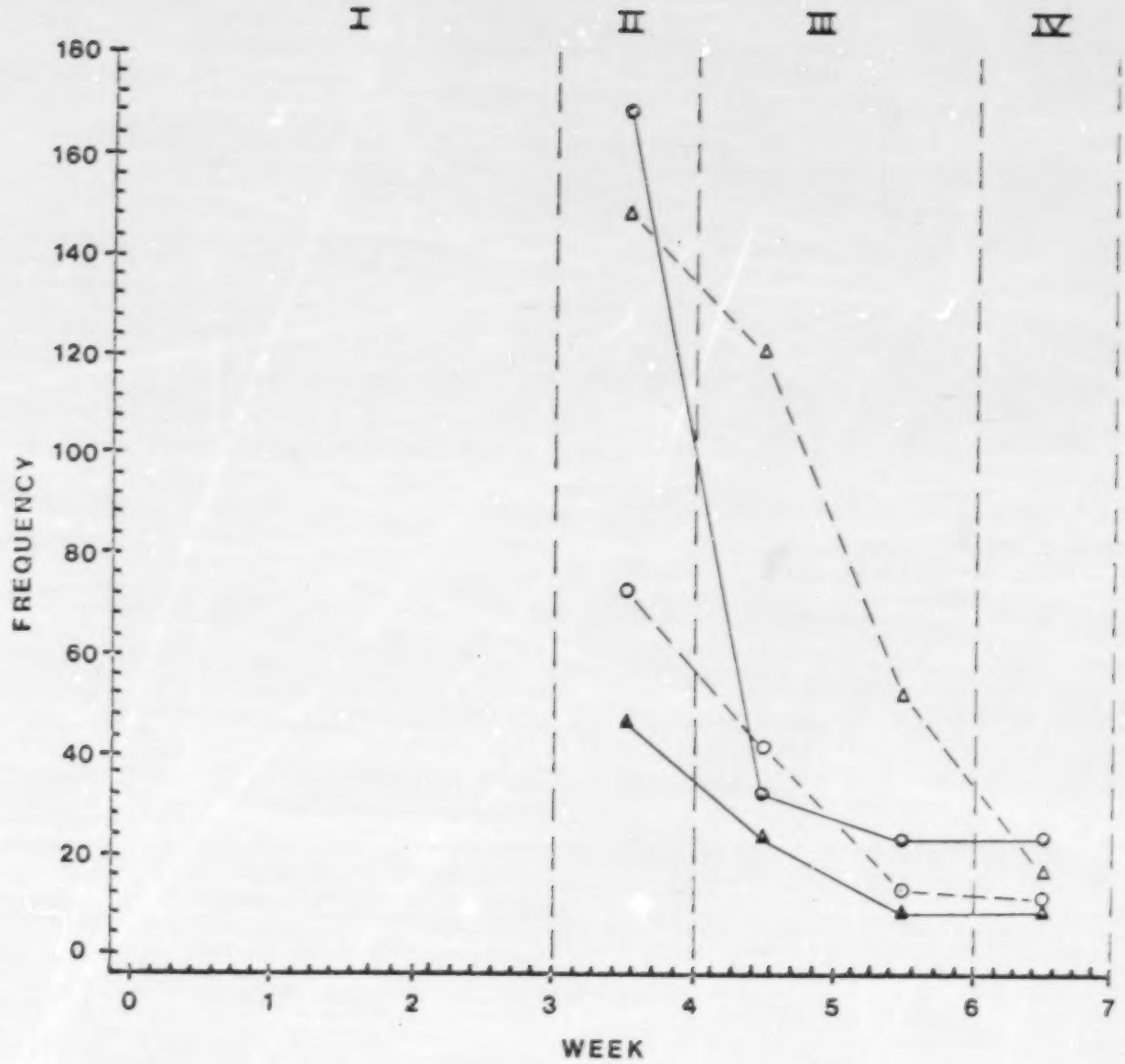


Figure 2.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II
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160
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2
3
4
5
6
7
WEEK

Figure 3.

3.02

THE EFFECT OF OLDER-PEER PARTICIPANT MODELS ON DEFICIENT ACADEMIC PERFORMANCE

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ABSTRACT

The literature on peer tutoring is characterized by empirically unsupported claims and by imprecise specification of the critical independent variables. Participant modeling procedures were taught to high school aged tutors who, after only eight contact hours, significantly increased the independently measured mathematics achievement of failing eighth grade students. Furthermore, grade point averages and attitude/behavior ratings from experimentally naive teachers also showed dramatic improvement. Possible reasons for non-generalization of the participant modeling treatment to self reported and behavioral attitude measures are discussed.

The Effect Of Older-Peer Participant Models On Deficient Academic Performance

Considerable print has been devoted to extolling the academic, economic, and humanistic benefits of peer tutoring (e.g., Criscuolo 1971, 1972, Goodman 1971, Marsden 1971). Elliott's (1973) review suggests that tutoring benefits the tutor as well as the child tutored (at least insofar as the imparting of elementary reading skills is concerned). With the exception of several behaviorally oriented studies done with young children (e.g., Hamblin & Hamblin 1972, Myers, Travers, & Sanford 1965, VonHarrison 1971, White 1971), however, hard data are rarely presented. Furthermore, precise specification of the critical independent variable, namely tutoring, is conspicuously absent from the tutoring literature. Hence, even if the null hypothesis concerning peer tutoring were to be adequately disproved, replication would indeed be difficult. Horan, Hill and De Girolomo (1973), for example, found that after 9 weeks of treatment students exposed to untrained high school aged tutors were performing according to teacher-assigned grades at an insignificantly lower level than the control group. "How to tutor" is apparently not intuitive! The crucial research question which thus emerges is "What kinds of tutor behavior, if any, can produce reliable changes in student performance?"

Token reinforcement via teachers or tutors has proved successful in strengthening the academic skills of disadvantaged young children (Hamblin & Hamblin 1972, Wolf, Giles, & Hall 1968). Proliferation of this technique in the schools, however, is undoubtedly hindered by "philosophical" objections (Skinner 1971) as well as the need for a modicum of technological expertise (reinforcement timing, back up, inflation, etc.). Modeling techniques, on the other hand, may be more appropriate for imparting complex skills to relatively sophisticated audiences. Such procedures have considerable popular appeal,

perhaps arising from their conceptual simplicity, the lessened degree of experimental rigor required in their application, and their versatility in terms of being able to be couched in both behavioral and nonbehavioral jargon. Furthermore, modeling very closely approximates what one stereotypically might expect tutors to do. Hence, an entirely "new system" need not be learned.

The effectiveness of models has been repeatedly confirmed in the promotion of certain adaptive skills (e.g., Krumboltz & Thoresen 1964, Thoresen & Hamilton 1972) and in the elimination of a number of social problems (e.g., Horan 1973, Sarason & Ganzer 1969). Participant modeling is a specific kind of modeling procedure in which the therapist displays successive approximations to a terminal adaptive behavior, and through speech, gesture, and/or physical contact, positively reinforces the client for exhibiting matching responses (see Rimm & Mahoney 1969 and Ritter 1969). Participant modeling, however, has not been specifically applied to the problem of deficient academic performance, nor has it been employed by adolescent paraprofessional personnel (high school aged tutors).

In the present study it was expected that students failing mathematics, who were exposed to older peer tutors trained in participant modeling procedures, would consequently exhibit superior academic performance than would similar students in a traditional treatment control group. Possible generalization of the experimental treatment to other academically relevant variables was also investigated.

Method

Forty eighth grade students (22 male and 18 female) who had failed mathematics during the third quarter of the academic year were stratified on sex and classroom and then randomly assigned to experimental and control conditions. The students came from five different classrooms wherein the number failing varied (n's: 4,6,8,10,12). The teachers were not informed as to which students

were receiving the experimental treatment; indeed, they were not even aware that a "control" group existed.

All of the students were assembled in a group for pre- and posttesting on attitude toward school (DeVault, Anderson, & Withall 1967), attitude toward mathematics (Mastantuono & Anttonen 1971), and mathematics achievement. The latter was assessed via an experimenter-made test containing 33 items (e.g., fractions, percents, integers) content valid with respect to this particular eighth grade curriculum. Furthermore, attendance figures, teacher-assigned quarter grades, and teacher-determined attitude-behavior ratings were secured for the previous quarter (pre-test) and the program quarter (post-test). The attitude-behavior rating scale is of unknown authorship. It contained 20 factors ranging from "cooperation" to "quantity of output," and was selected principally because the teachers were familiar with its content and use.

The 20 tutors in this study all came from the same twelfth grade mathematics classroom. This particular class contained students of relatively high academic ability, and its teacher agreed to positively reinforce tutor participation with points (convertible to higher grades) for each tutoring session. The tutors were also given considerable verbal reinforcement throughout the program by the experimenters.

Prior to student assignment, the tutors took part in two training sessions during which the participant modeling treatment was demonstrated. Essentially, the tutors were instructed to spend the first 15 minutes of each 45 minute tutoring session displaying the mathematics skills which their students would be expected to exhibit in class. (This information was conveyed to them before the sessions.) During the second 15 minute period, the students would then attempt to duplicate these modeled responses on similar mathematics problems. The final 15 minutes was to be reserved for feedback. All tutors were repeatedly cautioned "never to be negative." In going over the problems correct responses

(or procedures) were to be met with liberal positive reinforcement (e.g., "Good!" or "You're doing great!"). Wrong answers were not to be met with even the mildest form of punishment or ridicule, but rather a matter of fact illustration of the correct procedure. Informal monitoring of the tutoring sessions indicated that the tutors were, in fact, faithful to the participant modeling process.

Students in the experimental group met with their tutors twice a week for the last 6 weeks of the 9 week final quarter. Students in the traditional treatment control group were given a pep talk on the importance of good grades, and met with their counselors in order to discuss any problems they might be having.

Results

Separate 2 x 2 x 2 (treatment by sex by repeated measure) analyses of variance followed by Tukey WSD post hoc comparisons (Games 1971) were conducted on each of the six dependent variables. Depending upon the particular comparison, either the Mean Square Within Subjects or the Mean Square Within Cells was designated as the proper error term. The homogeneity of variance assumption and the homogeneity of variance-covariance matrix for the dependent measure were routinely examined for each analysis. In every case but one, the use of a pooled error term for the post hoc comparisons was appropriate. All post hoc tests were conducted at the .05 level of significance.

No significant sex effects emerged. Hence the means and standard deviations presented in Table I, have been collapsed across the sex variable and the effects described below apply equally to both males and females.

Insert Table 1 about here

Teacher-Assigned Grades

Post hoc comparisons on the treatment by repeated measure interaction [$F(1,36) = 7.9$, $p < .008$] indicated that the experimental group alone showed

significant improvement in teacher-assigned grades ($P<.05$). Although no differences existed at the beginning of the academic quarter, at the end of the quarter the students exposed to participant modeling were performing at a significantly higher level than those in the control group ($P < .05$). In practical terms, at the end of the study 55% of the students in the experimental group compared to 10% of the students in the control group received passing grades.

Teacher - Determined Attitude/Behavioral Ratings

Analysis of the significant treatment by repeated measure interaction [$F(1,36) = 7.18$, $P < .011$] revealed that teachers rated the attitudes and behaviors of the experimental students as improved ($P < .05$). No other comparisons were significant.

Mathematics Achievement

Initial analysis of a main effect for repeated measures on the experimenter-constructed mathematics achievement test indicated that both the experimental and control group displayed significant improvement [$F(1,36) = 9.11$, $P < .005$] with neither group differing from each other at the beginning or end of the study. However, failure to obtain the expected differences apparently was due to extreme fluctuations on the part of two subjects in the control group. This phenomenon resulted in a violation of the homogeneity of variance assumption ($P < .002$). Elimination of these two subjects followed by re-analysis produced a significant treatment by repeated measure interaction [$F(1,36) = 7.36$, $P < .01$]. Post hoc comparisons then suggested that only the experimental group had improved on the independent measure of mathematics achievement ($P < .05$).

Student Attitudes Toward Mathematics

No significant differences on a math attitude scale existed between the experimental and control subjects at the beginning or end of the study, nor as a result of exposure to the experimental conditions.

Student Attitudes Toward School

No significant differences on a school attitude scale existed between the experimental and control subjects at the beginning or end of the study, nor as a result of exposure to the experimental conditions.

Student Attendance

A main effect on repeated measures indicated that attendance figures increased significantly [$F(1,36) = 7.69$, $P < .009$] over the course of the study for both the experimental and control groups. This phenomenon was probably an artifact of history (e.g., improved weather conditions). No other differences appeared.

Discussion

The effects of the experimental program were pronounced. Adolescent students failing mathematics who were exposed to older peer participant models for a brief 6 week period in the final academic quarter significantly improved in grade point average and on an independent measure of mathematics achievement. Furthermore, their (experimentally naive) teachers reported that they displayed significantly better classroom attitudes and behaviors. On the other hand, similar students in a traditional treatment control group continued to perform rather poorly; nearly all received failing grades. That the experimental group's gains are attributable to the participant modeling process rather than the nonspecific effects of the tutors themselves is strongly suggested by an earlier study (Horan, Hill, De Girolomo, 1973) in which untrained tutors produced directionally negative differences.

Although the experimental treatment did generalize to classroom deportment, no differences between experimental and control students were found on self-reported measures of mathematics and school attitude and on school attendance. Several alternatives to the "behavior modification has limited generalization potential" interpretation are in order. In retrospect attitude improvement and

its behavioral manifestation, attendance, can not really be expected without feedback on improved performance. Since the experimental students did not become convinced of their accelerated mathematics achievement (via report cards) until after posttesting, there was little reason for them to perceive their academic future as being less dismal than that perceived by the control students. Furthermore, all of the students had histories of academic failure. It may well be that participant modeling treatment longer than 8 contact hours, beginning earlier in the year (if not in the life-time), and involving more than a single course area would be necessary to produce this sort of affective change. Finally, if improved attitudes are deemed important, perhaps it would be most parsimonious to define the behaviors from which one might infer such an internal state, instruct the participant models in their display, and reinforce the students for exhibiting matching responses.

Essentially, this study has found that participant modeling can be taught to paraprofessionals (high school aged tutors), and that brief exposure to older peer participant models can have a dramatic effect on deficient adolescent academic performance.

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TABLE 1

Means and Standard Deviations of Pre and Post Scores for Experimental

and

Control Subjects (Collapsed Over Sex) for Each Dependent Variable

DEPENDENT VARIABLE	EXPERIMENTAL (N = 20)				CONTROL (N = 20)			
	PRE-TEST		POST-TEST		PRE-TEST		POST-TEST	
	M	SD	M	SD	M	SD	M	SD
Teacher Assigned Grades	56.50	18.60	65.50	21.89	58.80	15.60	55.50	21.60
Teacher-Determined Attitude/Behavior Ratings	37.25	24.27	42.40	20.07	40.20	19.53	37.70	19.21
Mathematics Achievement (Analysis #1)	12.90	8.74	16.30	11.51	11.20	12.16	13.35	12.05
Mathematics Achievement (Analysis #2)	12.90	8.74	16.30	11.51	12.07	11.61	12.27	11.00
Student Attitudes Toward Mathematics	76.85	9.93	73.20	17.60	75.85	12.69	77.95	18.02
Student Attitudes Toward School	36.75	6.11	36.30	6.00	35.85	6.27	36.95	7.51
Student Attendance (Days Absent)	3.40	4.58	2.60	2.89	2.65	3.71	1.40	2.19

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DEPENDENT VARIABLE	EXPERIMENTAL (N = 20)				CONTROL (N = 20)			
	PRE-TEST		POST-TEST		PRE-TEST		POST-TEST	
	M	SD	M	SD	M	SD	M	SD
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Student Attitudes Toward Mathematics	76.85	9.93	73.20	17.60	75.85	12.69	77.95	18.02
Student Attitudes Toward School	36.75	6.11	36.30	6.00	35.85	6.27	36.95	7.51
Student Attendance (Days Absent)	3.40	4.58	2.60	2.89	2.65	3.71	1.40	2.19